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Mixed Oxide Fuel Fabrication Facility Ventilation and Confinement Systems

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A. BACKGROUND

In September 2000, the United States and Russian governments signed an agreement to irreversibly transform 34 metric tons (75,000 lb) of excess weapons plutonium into forms unusable for weapons. To implement this agreement, the United States decided to dispose of the surplus plutonium by irradiating 25.6 metric tons (56,000 lb) as mixed oxide (MOX) fuel in commercial nuclear power reactors and immobilizing the remaining 8.4 metric tons with high-level radioactive waste. In January 2002, the U.S. Department of Energy (DOE) decided to cancel the immobilization program and convert all the 34 metric tons (75,000 lb) to MOX fuel. DOE is responsible for this program and selected a contractor, Duke Cogema Stone & Webster (DCS) to design, construct, fabricate, and irradiate the MOX fuel. Congress assigned the U.S. Nuclear Regulatory Commission (NRC) the responsibility of licensing the MOX fuel fabrication facility. The facility will be based on the design of the Melox and La Hague facilities in France and will be constructed at DOE's Savannah River Site. The reactors chosen to use the MOX fuel are Duke Power Company's McGuire and Catawba stations.

NRC staff will use 10 CFR Parts 51 and 70 regulations as the basis for licensing the MOX fuel fabrication facility. The license review will be performed in two stages -- a construction approval review and an operating license review. For the first stage, provisions in 10 CFR 70.22 and 70.23 must be satisfied to begin construction. This stage will include the preparation of an environmental impact statement by NRC based on DCS's environmental report. The NRC staff must also approve the design bases of the principal structures, systems, and components and the quality assurance program before construction can start. Opportunities for hearings will be offered at each stage of licensing.

In February 2001, DCS submitted to the NRC an application to authorize construction of the facility (Reference 1). DCS is expected to submit an application to operate the facility in 2004 and plans to begin facility operation in 2007 and begin MOX fuel irradiation in 2007. In December 2001, a hearing was granted to Georgians Against Nuclear Energy and the Blue Ridge Environmental Defense League.

On April 30, 2002, the NRC issued a draft Safety Evaluation Report (DSER) to document the NRC staff's review of the application to authorize construction. Chapter 11.4 of the DSER provides the evaluation of the ventilation and confinement systems and discusses several open items that will need to be resolved before NRC authorizes construction of the MOX fuel fabrication facility.

B. NRC REVIEW OBJECTIVES

The objective of the construction authorization review is to determine whether the ventilation and confinement principal structures, systems, and components (PSSCs) and their design bases identified by the applicant provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents. The review of ventilation and confinement systems design bases and strategies was closely coordinated with the review of accident sequences described in the plant safety assessment.

The staff reviewed how the information in the application addresses the following regulations:

- Section 20.2001 of 10 CFR that authorizes a licensee to dispose of radioactive materials only by certain methods, including transfer to an authorized recipient, and by limited release in effluents.

- Section 70.23(b) of 10 CFR states, as a prerequisite to construction approval, that the design bases of the PSSCs and the quality assurance program be found to provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents.

- Section 70.64 of 10 CFR requires that baseline design criteria (BDC) and defense-in-depth practices be incorporated into the design of new facilities.

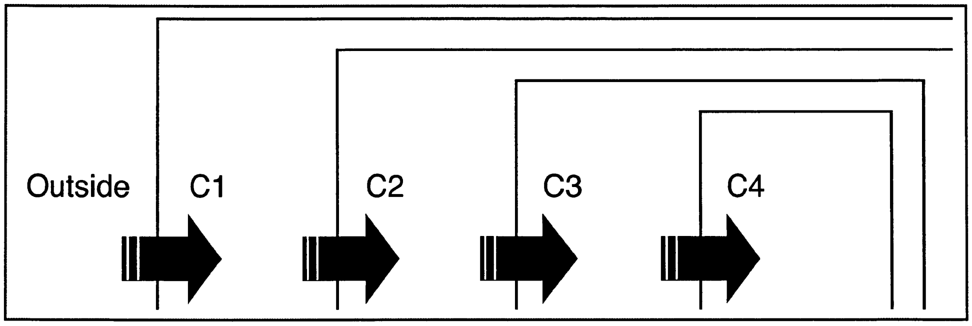
NRC staff also used NUREG-1718, "Standard Review Plan for the Review of an Application for a Mixed Oxide (MOX) Fuel Fabrication Facility," (Reference 2) as guidance in performing the review.

C. SYSTEM DESCRIPTION

DCS proposed a ventilation and confinement system to confine radioactive materials within process areas and gloveboxes and to ensure minimum dispersal of radioactive materials during routine operations and under accident conditions. The system was intended to meet the recommendations in Regulatory Guide 3.12 (Reference 3) and consists of:

- Ventilation zones operated at pressure differentials designed such that air leakage occurs from areas of low radiation hazard into areas with the greater radiation hazard See Figure 1.

Figure 1, Ventilation Confinement Zones



- A system of filters assemblies consistent with American Society of Mechanical Engineers (ASME) N509 (Reference 4) consisting of high efficiency particulate air (HEPA) filters, prefilters, and spark arresters intended to remove radioactive materials from process areas and occupied areas during routine operations and under accident conditions.

- A design in accordance with ASME N510 (Reference 5) to allow testing and in-service surveillance to ensure operability and required functional performance.

- Redundancy of PSSCs to ensure that the performance requirements in 10 CFR 70.61 are met.

- The design provides sufficient capacity and capability under routine operations. Under accident conditions involving fires, the proposed design has sufficient capacity to maintain air temperatures at the HEPA filters less than 230°C (450°F) and ensure that HEPA filters will remain operational. The applicant proposed to use air dilution of hot air from a fire area with air from other areas to protect the HEPA filters. The HEPA filters are capable of operating at temperatures up to 230°C (450°F) without severe degradation effects.

- Under accident conditions, the applicant is proposing to only take credit for the final filtration assemblies and not HEPA filters located on gloveboxes or at confinement zone boundaries. The applicant proposed to use a release factor of 1E-04 for the final filter assemblies in its accident safety analyses. The applicant based its proposal on having redundant HEPA filter banks in each redundant filter assembly with HEPA filters that have been tested to have an efficiency for removal of 0.3 micron particles of at least 99.97 percent. After installation, the HEPA filter banks will be leak tested in accordance with ASME N510 (Reference 5) to ensure that leakage efficiency is at least 99.95 percent. Under severe conditions, the applicant considers that each bank of HEPAs will remove at least 99 percent of particulates and will provide an overall efficiency of 99.99 percent for the two combined banks.

- Monitoring instrumentation, alarms, and controls to ensure that pressure differentials in confinement zones are maintained, alternative power supplies are actuated when needed, and the consequences of accidents are mitigated.

- A design providing for a safe air supply to the emergency control rooms consisting of heaters, coolers, prefilters, HEPA filters, and acid gas/organic vapor cartridges to remove chemicals. This system will maintain a safe environment during emergencies for personnel and equipment.

- A design that provides for removal and replacement of filters and other expected maintenance activities to minimize personnel exposures. The design allows for in-place testing of HEPAs in accordance with ASME N510 (Reference 5) to ensure that HEPAs have been properly installed and are undamaged.

- Gloveboxes that consist of welded stainless steel enclosures with windows, alone and in interconnected groups, that act as a primary barrier to confine hazardous (radioactive, toxic, or flammable) materials and to provide structural support capable of protecting process equipment during a postulated seismic event. MOX Fuel Fabrication Facility personnel access to equipment inside the gloveboxes is provided through access holes in the glovebox windows fitted with gloves that maintain the confinement boundary. Gloveboxes that contain powder or pellet forms are inerted with nitrogen gas to eliminate adverse effects of atmospheric oxygen on the process or fuel to preserve fuel quality.

- Glovebox window panels proposed by the applicant are generally polycarbonate (Lexan®) that may have lead-impregnated polymer sheets or lead-glass panels to provide additional radiation protection.

- The ability to safety shutdown the primary process is facilitated by the seismic design for the glovebox and similar equipment and structural support members. Equipment geometry and alignment must be maintained in order to maintain confinement. The glovebox system is designed to prevent physical interaction with confinement boundary elements or PSSCs under worst-case loading associated with normal, off-normal, accident, and design basis events in accordance with ANSI N690 (Reference 5). The system will also be designed to meet the criteria provided in Regulatory Guide 1.100, Rev. 2, "Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants," (Reference 6).

- Ductwork is designed, fabricated, and tested in accordance with ERDA 76-21 (Reference 13) and ASME N509 (Reference 4).

D. DESIGN BASES OF THE PSSCs

Design bases for the Ventilation and Confinement System PSSCs are shown in Table 1.

The staff reviewed the above design bases for the Ventilation and Confinement System PSSCs to ensure that there is reasonable assurance of protection against natural phenomena and the consequences of potential accidents. The design bases are consistent with Regulatory Guide 3.12 (Reference 3) and other industry air cleaning standards such as ASME N509, (Reference 4) ASME N510 (Reference 5), and ASME AG-1 (Reference 7).

For natural phenomena hazards, the staff reviewed the proposed design bases consistent with the accident analyses performed to show that the facility is adequately designed against natural phenomena with consideration of the most severe documented historical events for the Savannah River Site. The Ventilation and Confinement System gloveboxes, ductwork, and filter assemblies are designed to withstand the design basis earthquake. In addition, tornado dampers ensure that the effects of tornadoes, hurricanes, and high winds applicable to the proposed site do not degrade Ventilation and Confinement System PSSCs.

The staff reviewed the design bases of the Ventilation and Containment System to ensure that it can withstand the effects of environmental conditions and the dynamic effects associated with normal operations, maintenance, testing, and postulated accidents. The Ventilation and Confinement System is designed to withstand fire and chemical effects. In-place testing and maintenance of HEPA filters are performed in accordance with ASME N509 (Reference 4) and ASME N510 (Reference 5). HEPA filters are designed to withstand pressure transients

PSSC	System Function	Controlling Parameters	Status
C4 Confinement System	Control releases of plutonium; Remain operable during fires; Maintain differential pressure between glovebox and C3 areas; Maintain negative glovebox pressure in small breaches;	C4 zone pressure maintained at negative pressure with respect to C3 zone during normal operation and transients; Redundant pressure sensors to maintain C4 pressures; Designed to maintain exhaust safety function assuming single active component failure; Final HEPA filter assembly release fraction: 1E-4 Final HEPA filter design temperature of 230 C (450 F); Two 100 percent capacity redundant assemblies of two HEPA filter banks prior to discharge; Spark arrester and prefilters in each filtration assembly upstream of HEPA filters; Four 100 percent capacity fans in C4 discharge system; Fire isolation valves between designated fire areas; High-capacity flow system 38 m/min (125 ft/min) in the event of glovebox breach to maintain negative pressure; In-place HEPA filter testing for final discharge filtration assemblies; System design in accordance with Regulatory Guide 3.12, except heat removal is by airflow dilution; HEPA filter design; HEPA filter housing design, construction and testing; and HEPA filter housing isolation dampers in accordance with ASME N509; HEPA filter design and testing; HEPA filter housing design and testing; ductwork and pipe flexible connections; and fan design, construction, and testing in accordance with ASME AG-1; Ductwork piping design, construction, and testing in accordance with ASME B31.1; "Bubble tight" isolation valve construction and testing; HEPA filter housing testing; and HEPA filter testing in accordance with ERDA 76-21; Filter testing in accordance with ASME N510 with each HEPA stage having a leakage efficiency of 99.95 percent; Piping, valves, and fittings associated with gloveboxes in accordance with ASME B31.3; Fan power from normal (non-PSSC), standby (non-PSSC), emergency (PSSC), and uninterruptible (PSSC) supplies; Remains operational during facility fires and tornadoes and design basis earthquakes;	HEPA filter removal efficiency may be inadequate for severe accident conditions such as fires; HEPA filter soot loading capacity may be inadequate during fires
C3 Confinement System	Control releases of plutonium; Remain operable during fires; Ensure 3013 canister storage area temperature; Provide cooling air to electrical rooms;	C3 zone pressure maintained at negative pressure with respect to atmosphere during normal operation and transients; HEPA filter release fraction: 1E-4; HEPA filter design temperature of 230 C (450 F); Designed to maintain exhaust safety function assuming single active component failure; Two 100 percent capacity redundant assemblies of two HEPA filter banks prior to discharge; Spark arrester and prefilters in each filtration assembly upstream of HEPA filters; Two 100 percent capacity fans in C3 confinement system; Fire-rated dampers between designated fire areas; In-place HEPA filter testing for final discharge filtration assemblies; System design in accordance with Regulatory Guide 3.12, except heat removal is by airflow dilution; HEPA filter design; HEPA filter housing design, construction and testing; and HEPA filter housing isolation dampers in accordance with ASME N509;	HEPA filter removal efficiency may be inadequate for severe accident conditions such as fires; HEPA filter soot loading capacity may be inadequate during fires

		HEPA filter design and testing; HEPA filter housing design and testing; ductwork and pipe flexible connections; and fan design, construction, and testing in accordance with ASME AG-1; Sheet metal ductwork design, construction, and testing; "bubble tight" isolation damper construction and testing; HEPA filter housing testing; and HEPA filter testing in accordance with ERDA 76-21; Filter testing in accordance with ASME N510 with each HEPA stage having a leakage efficiency of 99.95 percent; Tornado dampers; Fan power from normal (non-PSSC), standby (non-PSSC), and emergency (PSSC) supplies; Remains operational after facility fires, tornadoes, and design basis earthquakes;	
C2 Confinement System	Control releases of plutonium	Two HEPA filter banks prior to discharge; Spark arrester and prefilters in each filtration assembly; HEPA filter design temperature of 230 C (450 F); Fire-rated dampers between designated fire areas; In-place HEPA filter testing for final discharge filtration assemblies; System design in accordance with Regulatory Guide 3.12; HEPA filter design; HEPA filter housing design, construction and testing; and HEPA filter housing isolation dampers in accordance with ASME N509; HEPA filter design and testing; HEPA filter housing design and testing; ductwork and pipe flexible connections; and fan design, construction, and testing in accordance with ASME AG-1; Sheet metal ductwork design, construction, and testing; "bubble tight" isolation damper construction and testing; HEPA filter housing testing; and HEPA filter testing in accordance with ERDA 76-21; Filter testing in accordance with ASME N510 with each HEPA stage having a leakage efficiency of 99.95 percent; Tornado dampers; Final filters and downstream ductwork remain structurally intact during and after tornadoes and design basis earthquakes;	
Process Cell Exhaust System	Control release of plutonium; Ensure equipment venting to prevent over-pressurization; Control of explosive vapors and hydrogen	HEPA filter release fraction: 1E-4; Two 100 percent capacity filtration stages (using electric heaters and two HEPA filter stages); Spark arrester and prefilters in each final filtration assembly; HEPA filter design temperature of 230 C (450 F); System design in accordance with Regulatory Guide 3.12; HEPA filter design; HEPA filter housing design, construction and testing; and HEPA filter housing isolation dampers in accordance with ASME N509; HEPA filter design and testing; HEPA filter housing design and testing; ductwork and pipe flexible connections; and fan design, construction, and testing in accordance with ASME AG-1; Sheet metal ductwork design, construction, and testing; "bubble tight" isolation damper construction and testing; HEPA filter housing testing; and HEPA filter testing in accordance with ERDA 76-21; Filter testing in accordance with ASME N510 with each HEPA stage having a leakage efficiency of 99.95 percent; Final filters and downstream ductwork remain structurally intact during and after tornadoes	HEPA filter removal efficiency may be inadequate for severe accident conditions such as fires

		and design basis earthquakes;	
Emergency Control Room Air-Conditioning System	Maintain habitable conditions in the event of accidents	One 100 percent capacity filtration stages (using prefilter stage, two HEPA filter stages, and chemical filters) for each control room air supply; One 100 percent capacity air handling unit per control room; One 100 percent capacity exhaust fan and one 100 percent capacity booster fan; Designed to maintain protection assuming single component failure; HEPA filter design temperature of 230 C (450 F); Tornado dampers prevent pressurization in supply air system; In-place HEPA filter testing for final discharge filtration assemblies; System design in accordance with Regulatory Guide 3.12; HEPA filter design; HEPA filter housing design, construction and testing; and HEPA filter housing isolation dampers in accordance with ASME N509; HEPA filter design and testing; HEPA filter housing design and testing; ductwork and pipe flexible connections; and fan design, construction, and testing in accordance with ASME AG-1; Sheet metal ductwork design, construction, and testing; "bubble tight" isolation damper construction and testing; HEPA filter housing testing; and HEPA filter testing in accordance with ERDA 76-21; Filter testing in accordance with ASME N510 with each HEPA stage having a leakage efficiency of 99.95 percent; Fan power from normal (non-PSSC), standby (non-PSSC), and emergency (PSSC) supplies; Remains operational during and after facility fires and after tornadoes and design basis earthquakes;	
Emergency Diesel Generator Ventilation System	Provide emergency generator ventilation	One 100 percent capacity air conditioning unit for each switchgear room; One 100 percent capacity roof ventilator for engine room cooling during standby (engine fan cools room during engine operation); Fan power from normal (non-PSSC), standby (non-PSSC), and emergency (PSSC) supplies; Remains operational after facility fires, tornadoes, and design basis earthquakes;	
Glovebox Pressure Controls	Maintain glovebox pressure	Redundant pressure sensors to monitor differential pressures and provide alarm; Remains operational after facility fires in non-affected areas, tornadoes, and design basis earthquakes;	
Tornado Dampers	Protect ventilation system from tornado effects	Resists design basis tornado effects; Remains operational after facility fires and design basis earthquakes;	
Supply Air System	Supply emergency cooling air to canister storage area and electrical rooms; Maintain confinement zone differential pressures	Provide supply air for emergency cooling; HEPA filter stages for static confinement; System design in accordance with Regulatory Guide 3.12; HEPA filter design and housing isolation dampers in accordance with ASME N509; HEPA filter design and testing; ductwork and pipe flexible connections; and fan design, construction, and testing in accordance with ASME AG-1; Sheet metal ductwork design, construction, and testing; "bubble tight" isolation damper construction and testing; and HEPA filter testing in accordance with ERDA 76-21;	

considering filter loadings and fan suction pressures. Filter replacement will be performed using bag-in, bag-out procedures to reduce the possibility of spreading contamination.

For potential accidents involving fires, staff reviewed the proposed design bases consistent with the applicant's fire hazard analysis, which describe the analyses and design features applicable to fire protection. Design features of the Ventilation and Confinement System for fire protection include filter assembly redundancy, use of dilution to mitigate the high temperature effects of a fire, use of spark arrester to prevent hot particles from contacting and starting fires on filters, and use of two redundant banks of HEPA filters in each filter assembly having a temperature rating of 230°C (450°F) and meeting UL 586 standards (Reference 8). The applicant considered the effects of fire on the Ventilation and Confinement System. The applicant assumed that fires are restricted to single fire areas and will not spread. NRC staff reviewed the fire protection program and concluded that during fires temperatures at the HEPA filters can be maintained less than 230°C (450°F) and HEPA filters can be protected without severe temperature effects.

Under accident conditions, the applicant is proposing to only take credit for the final filtration assemblies and not HEPA filters located on gloveboxes or at confinement zone boundaries. The applicant proposed to use a release factor of 1E-04 for the final filter assemblies in its accident safety analyses. The applicant based its proposal on having redundant HEPA filter banks in each redundant filter assembly with HEPA filters that have been tested to have an efficiency for removal of 0.3 micron particles of at least 99.97 percent. After installation, the HEPA filter banks will be leak tested in accordance with ASME N510 (Reference 5) to ensure that leakage efficiency is at least 99.95 percent. Under severe conditions, the applicant considers that each bank of HEPAs will remove at least 99 percent of particulates and will provide an overall efficiency of 99.99 percent for the two combined banks. The staff, however, considers that a release factor for each filter assembly of no more than 1E-02 should be used under severe conditions such as a fire. Because the filter assembly contains spark arresters to minimize the possibility of hot embers contacting filters; prefilters to minimize HEPA filter dust loadings; and HEPA filters that meet UL 586 (Reference 8) fire resistance standards and can operate at temperatures up to 450°F, staff considers that the filtration assemblies can perform their intended function under conditions of fire. However, there have been facility fires that have damaged filters in ventilation systems, and because of the uncertainties in the environmental conditions that expose the HEPAs under potential fires and can degrade its performance, the staff considers that an increased release factor is needed. This is consistent with staff recommendations in NUREG/CR-6410 (Reference 9) that under severe conditions a particulate removal efficiency of 95 to 99 percent should be used for HEPA filter assemblies. Therefore, the staff has an open item related to the total assumed particulate release factor for accident analyses where severe environmental conditions are present.

NRC staff also reviewed a soot generation analysis performed by the applicant to ensure that filter loadings during a fire would not adversely affect filter integrity. Under accident conditions involving fires, the proposed design may have inadequate capacity to remove soot loadings. Using the Ballinger correlation (see Reference 10), the applicant computed a maximum HEPA filter loading of 4.08 kg/filter (9.0 lb/filter) at a differential pressure of 27.2 cm (10.5 in.) water gauge (WG). The largest fire loading was computed to be 3.5 kg/filter (7.7 lb/filter). Using the Ballinger correlation, the staff computed a maximum HEPA filter loading of 1.2 kg/filter (2.6 lb/filter) for the proposed 42.5 cubic meters per minute (1500 cubic feet per minute (CFM)) sized HEPA filter at a 25.4 cm (10 in.) WG differential pressure (a differential pressure of 25.4 cm (10 in.) WG is the highest recommended loading for nuclear-grade HEPA filters). Therefore, the applicant's assumed soot loading capacity may be inadequate. Excessive HEPA filter soot loadings can result in damaged or ruptured filters and excessive releases to radioactive material. Therefore, the staff has an open item related to the soot generation analysis applicable to fire accidents.

The staff reviewed the design bases of the Ventilation and Confinement System to ensure that it provides adequate protection against chemical risks produced from licensed material, facility conditions that affect the safety of licensed material, and hazardous chemicals produced from licensed material. Gloveboxes are constructed welded stainless steel to resist the corrosive effects of chemicals used in aqueous polishing and MOX fuel fabrication processes. In addition, ductwork and filter assemblies are stainless steel, and filter materials will be designed to also withstand the chemical effects resulting from normal operations. As indicated above, during fires, HEPA filters may be unable to remove greater than 99.99 percent of particulates and may become overloaded with soot.

The staff reviewed the design bases of the Ventilation and Confinement System to ensure that it provides for emergency capability to control the release of licensed material during normal operations and under postulated accident conditions. Release of licensed material is controlled by the use of redundant HEPA filter banks in redundant filter assemblies. Individual HEPA filters are tested to ensure that individual HEPA filters are capable of removing at least 99.97 percent of 0.3 micron particles. Following installation, PSSC HEPA filters are in-place tested in accordance with ASME N510 (Reference 5) to ensure that leakage around filter banks is less than 0.05 percent.

The staff reviewed the design bases of the Ventilation and Confinement System with respect to electrical power supply. The C4 confinement system is supplied by normal, standby, emergency, and uninterruptible power supplies. The C3 exhaust system, the emergency control room, and emergency diesel generator systems are supplied by normal, standby, and emergency power supplies. The C2, and process cell exhaust confinement systems and the supply air system are supplied by normal and standby power supplies. These diverse power supply systems will ensure continued operation of Ventilation and Confinement System PSSCs. The staff reviewed the proposed design bases of Ventilation and Confinement System PSSCs to ensure that it provides for adequate inspection, testing, and maintenance to ensure availability and reliability to perform their function when needed. Redundant filter assemblies are provided so that single filter assemblies can be taken offline for maintenance, testing, and replacement of filters. Dampers can be used to isolate individual filter assemblies and fans. The filter assembly design includes provisions for in-place testing of HEPA filters in accordance with ASME N510 (Reference 5). Filter assemblies use bag-in/bag-out designs for filter replacement to minimize the possibility of spreading contamination.

The staff reviewed the proposed design bases of the Ventilation and Confinement System to ensure that it provides for criticality control and adherence to the double contingency principle. Based on experience from the Melox site, the applicant assumed that up to 3 kg (6.6 lb) of PuO_2 could exist in the glovebox HEPA filter located in the pellet grinding glovebox, where material becomes airborne at a rate of 0.3 grams (0.00066 lb) per hour, and assuming that the HEPA filters are replaced at 450 day intervals. This amount would be subcritical, as 3 kg (6.6 lb) of PuO_2 is substantially less than the minimum critical mass. ANSI/ANS-8.1 (Reference 11) contains single-parameter (*i.e.*, always safe) subcritical limits for $^{239}PuO_2$ containing not more than 1.5 wt. percent water. At full density, the subcritical limit is 10.2 kg (22.5 lb); at half density, the subcritical limit is 27 kg (59 lb). This would bound the worst-case conditions that could be found in the HEPA filters, because the ANSI limits conservatively assume the plutonium is all ^{239}Pu (MOX plutonium will have at least 4 wt. percent ^{240}Pu), and the maximum density for unsintered PuO_2 powder falls within the density range covered by the limits in ANSI/ANS-8.1 (Reference 11). The staff also evaluated the potential for moderation due to moisture and the presence of organics, and found that adequate consideration was given to moderation effects on the maintenance of subcritical limits.

The staff reviewed the proposed design bases of the Ventilation and Confinement System to ensure that it provides for instrumentation and control systems to monitor and control the ventilation and confinement PSSCs. These instrumentation and controls include pressure instrumentation and controls to maintain proper negative pressures in each of the separate confinement zones; manual and automatic damper controls to regulate air and gas flows within gloveboxes and confinement zones; controls for the transfer of alternate power supplies; instrumentation to measure differential pressures across filter banks; variable-speed controls for fan operation; air temperature and airflow instrumentation; and nitrogen and dry air supply controls.

E. SUMMARY

The draft SER is a snapshot of the NRC staff's present positions, based on information received to date. The staff's review will continue, and the staff expects to issue a revised draft and a final SER on construction after evaluating further information to be submitted by the applicant. Based on the staff's review of the Ventilation and Confinement System, the staff identified two issues related to the air cleaning systems that need to be resolved prior to authorizing construction of the facility. The issues are as follows:

- The HEPA filter removal efficiency for severe accidents such as fires should be 99 percent, not 99.99 percent as the applicant has assumed.

- The soot analysis indicates that HEPA filters may be overloaded during fires and the ventilation system design capacity may be inadequate.

DCS has stated that it will provide additional information concerning the above issues. This additional information will be further reviewed by the NRC staff.

F. REFERENCES

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